

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

ON THE COMPOSITION AND DECOMPOSITION OF
FRESH WATER MUSSEL SHELLS WITH
NOTES AND QUERIES.

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Thirty years ago, more or less, during my connection with the University of California, there came to hand from some forgotten source, a number of the common West Coast fresh-water mussels *Anodonta nuttalliana*. I was about to discard the soft parts when it occurred to me it would be better to keep the mussels alive with the possibility of learning something of their habits or behavior. Accordingly they were placed in improvised aquaria, and the water renewed every day. My time was so closely occupied with various duties that daily renewal of the water was about all the attention they received. In one instance through oversight, the water became stale and the mussels died, so the jar and its contents were placed outside the house. In a short time the soft parts became putrid and soon after the enclosing shell also; gradually dissolving like ordinary glue, leaving nothing but two thin, fragile discoid scales of lime, something less in size than a half-dollar, the remains of the two valves. The proportion of limy to membranous or animal matter, was so exceedingly small as to be noteworthy.

As all of the so-called species of *Anodonta* that occur in the Columbia and Sacramento drainage basins, with the possible exception of *A. (Gonidea) angulata*, belong to the group of which the widely distributed *A. cygnea* is the type, it may fairly be assumed that the proportion of animal to mineral matter in the shells (or valves) as observed in *A. nuttalliana*, is the same or about the same in the other species here, there and everywhere classed with *cygnea*.

The small proportion of limy to animal matter is conspicuously exhibited in the tendency of the thin *Anodonta* shells to crack through the shrinking of the periostracum, not infrequently fracturing a specimen beyond repair.

These proportions of lime and animal matter (to use simple language), are apparently reversed when the shells of *Unio* are compared with those of *Anodonta*.

Dr. Philip Carpenter, writing nearly fifty years ago, with the Fresh-water Mussels of the Mississippi drainage in mind, remarked: "In no other known portion of the earth is there so large an area covered with soluble limestone. The water of the rivers being saturated with this would be unfit for many of its uses, were it not for the immense development of this group of heavy shells. The North American *Unios* may be regarded as so many water-filters absorbing the lime from the water, and preserving it from re-absorption by their strong, horny skins."*

These few lines suggest the following questions:

First. Is the nearly absolute lack or absence of the *Unio* form in the drainage basins of the Columbia and Sacramento rivers probably, or measurably, due to a smaller proportion of lime in the waters of said basins, as compared with the Mississippi waters?

Second. Is there a corresponding discrepancy or absence of the *Anodonta* form in the Mississippi basin?

To the latter query only one answer is possible.

Turning back to the *A. cygnea* group and the consideration of the wide dispersion of *cygnea* we find a companion in its extraordinary range of distribution in *Margaritana margaritifera*. This wide distribution is not only geographic in the ordinary sense but hypsometric also, and this companionship includes the West American forms observed in the Columbia and Sacramento basins.

While inhabiting the same waters, though not as heavy as many of the *Unios* of a corresponding size, the proportion of limy to animal matter is much greater than in the thin-shelled *Anodons* herein mentioned.

The coincident distribution of these two forms suggests something more than an unrelated and isolated fact.

* The presumed unfitness of the water of the rivers for many of its uses, being neutralized by the *Unios*, etc., may be regarded as somewhat fanciful.

The late Dr. Cooper* regarded the West Coast mussels, *Anodonta wahlamensis*, *A. oregonensis* and *A. californiensis* as varieties of *A. nuttalliana*, the last named being the first in order of description and publication by Dr. Lea in his Observations, etc., thus endorsing my conclusions as previously published in 1882.† Whether Dr. Lea's species and Dr. Trask's *A. triangularis* and *A. rotundata* are simply mutations of *nuttalliana* or otherwise, it is not necessary to discuss at the present moment. These and numerous undescribed mutations occur in a multitude of localities, often in great abundance, in the above-named Western basins and their tributaries, alike in running or still waters, subject to various environmental conditions.

* Catalogue of West American and many Foreign Shells, etc., printed for the State Mining Bureau, April, 1894, Sacramento, State Printing Office, 1894.

† On the History and Distribution of the Fresh Water Mussels, and the Identity of Certain Alleged Species. Proc. California Academy of Sciences, November 20, 1882.